EVALUATION OF FIRE STRENGTH INDICATORS OF MULTI-STORY CIVIL BUILDING STRUCTURES IN SEISMIC ACTIVE AREAS

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Abstract: This article provides information on the post-fire inspection of high-rise civilian building structures in seismically active areas and the determination and evaluation of their strength indicators.

Key words: Seismic, building, reinforced concrete, metal, structure, strength, assessment, after fire.

Introduction. Today, Uzbekistan and the regions of Central Asia are among the seismically active zones. Many cities in the republic (Tashkent, Fergana, Namangan, Samarkand, etc.) are located in areas with a risk of earthquakes of magnitude 7–9. At the same time, as a result of the intensification of urbanization processes, the number of multi-storey residential buildings is increasing.

After fires in such buildings, the strength and seismic stability of structures are likely to decrease significantly. Therefore, assessing the condition of buildings after a fire in seismically active areas and determining their suitability for operation or unsuitability is an urgent scientific and practical issue. Today, in the world scientific literature, a lot of work has been done to study the strength of concrete, metal and composite structures under the influence of fire. However:

- In many cases, studies were conducted without taking into account the effects of earthquakes;
- methods of complex fire-earthquake condition assessment for buildings in seismically active areas are not sufficiently developed;
- There are few models that take into account the temperatures, concrete grades, reinforcement types, and construction technologies specific to Uzbek conditions.

Main part. As a result of fire, internal structural changes in structural materials, the appearance of microcracks, a decrease in the degree of hardening of concrete, plastic deformation of steel elements, negatively affect the overall stability of buildings. If these changes are not adequately analyzed, the structural strength may be incorrectly assessed when reusing or repairing damaged buildings.

Therefore, it is necessary to create a normative basis for assessing the strength of structures after a fire, and to develop specific recommendations through experimental and computational studies.

Research methods and to do increase methodology.

1. Theoretical analysis methods:

At the initial stage of the study, the available scientific literature, international standards (Eurocode, ACI, ISO, KMF), scientific articles, and practical experience were analyzed, and the following were studied:

- construction solutions of high-rise buildings in seismically active areas and their seismic stability characteristics;
- laws of physical and mechanical changes of concrete, reinforced concrete and metal structures under the influence of temperature;

- scientific approaches and calculation methods for assessing the condition of structures after a fire.

2. Experimental research methods.

Experimental research temperature in the mechanical properties of concrete and reinforcement elements under the influence change to determine was addressed.

Here is the following: stages to do increased:

- concrete and reinforcement samples of various brands prepared;
- to them various temperature range (200°C – 800° C) was done;
- temperature from the influence then compression , bending , breaking and strain limits laboratory tests on was held;

- taken results according to strength decrease coefficients and temperature - consistency connections was determined.

3. Calculation and modeling methods.

From the fire the latest construction status in evaluation computer modeling and numerical calculation from methods used.

In this case:

- Structural diagrams of multi-story buildings were created as 3D models in ANSYS, ABAQUS, and MIDAS Civil programs;
- in models temperature distribution, thermal stresses and deformations was calculated;
- seismic impact (earthquake downloads) according to dynamic analysis was held;
- limit states of strength and stability of the structure in various scenarios (fire duration, temperature level, type of reinforcement, concrete grade, etc.) were determined.

Expected results:

- A single comprehensive method is developed to assess the structural strength of buildings after a fire in seismically active areas.
- Concrete and reinforcement materials from temperature next the situation expressive legal connections and models will be created.

- Real buildings for practical recommendations and assessment criteria is formed.

Conclusion. The issue of assessing the structural strength of buildings after a fire in seismically active areas is of great scientific, practical and social relevance in modern construction practice and ensuring human safety . The results of this research will allow us to achieve a new level of safety and stability in the construction industry.

Scientifically based, practically applicable systematic approach to the assessment of the stability of high-rise building structures in seismically active areas after a fire.

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